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astroglia
atopy
azorubin test

barbituism
baresthesia
Botelho's test
biacatalyst
brachybasia
bradyphrenia

calcanodynia
caprokol
carbonuria
cardiazol
cardiogenesis
catholyte
cataxia
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coramin
cordopexy
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decollement
demucosation
dermatoscopy
diogenism
Dochez's serum
dysembryoplasia

ecto-antigen
ectoscopy
electronation
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endovaccination
entalaçao
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gingivectomy
glucokinin
gonophage
gynase

hemotonia
histase
histogram
hypercalcemia
hyperketonuria
hypermorph
hypertelorism
hypervolemia
hypocyclosis
hypovolemia

insuloma
interrenalism
intersex
ipral
isocain
ithmospasm

leptospirosis
lipodieresis
lipophagic

malariotherapy
maratrik
megalo-ureter
menostaxis
meroxyl
mesomorph
microglia
microsyringe
morphophyly
mortamin
myelography

narcolysis
neochinamyl
nephrorosein
neurovaccine
nirvanol
normovolemia
notogenesis

odontotomy
oligodendria
omphalogenesis
oncol sis
oscodal
osmics

pelvisection
pestology
physiophyly
plasmochin
poikilionia
prelocomotion
proctostasis
progonoma
pyophagia
pyopneumocyst

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THE LURE OF MEDICAL HISTORY[1]

THE advantages of a respectable acquaintance with the history of one's profession should be obvious to all and have been recognized by many. Littré, the great lexicographer, realized that without its background a science is reduced to the category of a mere trade, and Goethe with no great poetic license maintained that the history of a science is the science itself. If "each age steps on the shoulders of the ages that have gone before" (Foster), then certainly those who hope to be in the forefront of medicine must be acquainted with the body of the preceding age on whose shoulders they are to step. As a matter of practical importance, too, knowledge of how knowledge accrues and of the mistakes of the past is of prime importance in preventing similar mistakes in our present work and no one is on more unsafe ground or slips with less regret on the part of the onlookers than the coxcomb, who, disregarding the past as a dead and buried conglomeration of futile and incorrect superstitions, stakes his all on his own limited vision. As Osler says, "By the historical method alone can many problems in medicine be approached profitably. For example the student who dates his knowledge of tuberculosis from Koch may have a very correct, but a very incomplete appreciation of the subject." As a matter of fact, how many go even as far back as Koch?

If this is so widely recognized, why is the average ignorance of the history of our art so appalling? Chiefly because of the college and state board examinations, which before all else must be passed, so that with rapid accumulation of the facts of medical science, the curriculum becomes more and more overcrowded, the "exam" correspondingly more difficult and your vicious circle is established.

Fortunately, there are signs of a rift in the clouds, permitting the undergraduate student to regain from the curriculum time for thought and the cultivation of some of what might be called the "belles lettres" of his chosen profession. Prominent among these is the history of medicine, which, if impossible for most of us to cultivate as a scientific discipline on account of more pressing work, can at least fill the position of that most useful and important activity—a hobby. Many an American physician has drawn boundless pleasure from this particular hobby and a few even

[1] From the laboratories of the Philadelphia General Hospital. An address to the Piersol Anatomical Society of the University of Pennsylvania, February 18, 1927.

have made it produce valuable contributions to the subject. Who can estimate what pleasure and benefit Osler, for instance, got from medical history, and not the least of his contributions to the art in which he became world famous was in this domain.

How can we best begin to acquire an interest in this topic, so fascinating if properly approached, so repelling as it is unfortunately often thrust at us? Certainly not by sitting down with ponderous dusty tomes, which dogmatically expound the general subject, determined to master them at the rate of so many pages a day or week. Here, above all, must we avoid what the French have so aptly termed "l'ennui de tout dire." Neither, except the teacher has the gift of tongues, can we get the spirit from systematic lectures on medical history. Such a prescribed course was given when I was an undergraduate by a lecturer on the subject who after about twenty lectures had not yet covered the Egyptian period! Small wonder that but few were found conscientious enough still to attend. Lectures on special topics, on the other hand, can be made most interesting as well as instructive. Dr. Charles Singer, one of the most eminent of English-speaking medical historians, gives such a course at the University College Hospital, London, covering different fields each year. When I was there three years ago, he was lecturing on the acute infectious diseases. The lecture that I heard, devoted to the history of syphilis, was attended by over one hundred students and physicians and was illustrated with numerous lantern slides and exhibits of interesting old books and prints on the subject. The elective course offered here by Dr. Packard last fall was along similar lines, but unfortunately his illness forced him to abandon it when he had only covered the subject of anatomy. If given next year, as I hope it will be, I should certainly recommend its selection as an elective by the senior students. Also it has no examinations!

Now how can one best begin one's own acquaintance with a subject, from which, as in any other activity, one gets out about as much as one put into it? While each individual will work this out best according to his own temperament, most will find their interest most actively stimulated by selecting some topic, perhaps already suggested by an incident in their medical work and really learning a lot about that one subject or perhaps even contributing to the general knowledge of the topic. This of course requires that the topic selected be not too large. I have followed such a plan more than once to my own satisfaction. Having had to work with heart block as a second-year student, I chose the history of the subject when assigned a task for my undergraduate medical society (now alas defunct) and am confident that this was a potent factor in keeping me interested in this condition ever since. Your teachers are frequently dropping chance or purposeful remarks that will serve admirably as a catalyzer for any one on the alert to begin some reading of this kind. If still lacking a subject, an appendix to Garrison's "History of Medicine" suggests a number of such topics, sufficiently restricted to be mastered without exorbitant demands of time.

For instance, with the inroads now being made on legitimate medicine by osteopathy, chiropraxy and the various isms, any one of us should be interested in learning about the quackery and superstitions of previous ages—yes, and having learned about them, be better able to cope with what later might become a very practical matter directly affecting the fatness of our own pocketbooks.

He among you who has already picked out his own specialty—not always a wise thing to do at this stage of your career—is bound to have more satisfaction out of his life's work, as well as being a better hand at it, if he is well acquainted with its past. This research in itself will give him some of the pleasures of an investigator—for few of the specialties have had their history written up as such. Most of us at one time or another have wanted to be an obstetrician. What, for instance, is the history of this most ancient of specialties and how recently did it graduate from the midwife stage?

We are all more or less hero-worshippers at bottom—a quality to be proud of rather than ashamed of—and our profession has had more than its share of heroes. Why not become more intimately acquainted with some of these giants? What can be more dramatic reading than the story of Walter Reed, yellow fever and the Panama Canal; Ronald Ross and the malarial mosquitoes or Bruce and the tsetse fly? Pasteur was recognized by French popular vote as a greater national hero than Napoleon and is now commemorated by a special set of French postage stamps in current issue, and yet the average medico knows much less of the life of this altruistic, constructive genius of a kindred profession, whose work influences practically every step he takes in his daily rounds, than of the egotistical, destructive general who crippled his country in acquiring personal fame. How many of us carry our acquaintance with Pasteur further than the pasteurization of milk or the treatment of rabies? Lister's epoch-making work was done during the youth of many still living and yet to how few of us is he anything more than the prefix to a mouth wash? Liebig, one of the discoverers of chloroform and a pioneer in many branches of physiological chemistry, exists to most of us as an "ad" for meat extract.

You, over there, who a few years ago were debating whether you would be a physician or a painter, why not find out how many men in the past have been both and what effect the combination had on them or, more broadly, what effect has art in general had on medicine? Such physician writers as S. Weir Mitchell, Oliver Wendell Holmes or poets such as Garth, Armstrong and Goldsmith should awaken our curiosity to know how many more have drunk of the Pierian spring as well as successfully followed some phase of medical art or science.[2]

If preventive medicine is to dominate the medicine of the next generation, surely he who is acquainted with its successes and failures in the past will be better equipped to adapt himself to and profit by the situation in the future. And so on through dozens of topics, too numerous even to hint at, that will suggest themselves as readily to you as I can. Break the ice, take the initial step and the rest will follow of its own impetus.

As Emerson has said, "Take hold anywhere," and Garrison[3] has suggested a number of such amusing lines along which medical students might break into medical history:

> The gold headed cane, St. Anthony's fire, the red and white stripes on the barber's pole, the duels of physicians, the blood suckers who attended duelists in the eighteenth century in order to suck their wounds, the wound drinks of the middle ages, the purgative inks of the Arabians, the anodyne necklaces, quassia and antimony cups of the past as compared with the medicated milks, iodated foods and diuretic wines of the moderns, cupping and leeching, the seton and the moxa, the sympathetic powder for healing wounds at a distance, the use of the bare foot as a thermometer in the middle ages, the introduction of Dover's powder by a buccaneer, the statues erected to the memory of great physicians and the streets named after them, the quacks of the eighteenth century, the medical graduation ceremony, the use of botanical gardens to teach materia medica, hex-doctoring in Pennsylvania, the medical superstitions and folk-ways of different races, any one of these subjects, taken at random as a starting point and closely studied, will throw you into the full current of medical history.

[2] Dr. Garrison furnishes the following additional names: (poets) Akenside, Beddoes, Blackmore, Bridges, Campion, Crabbe, Haller, Head, Kussmaul, Littré, Lodge, McCrae, Record, Ronald Ross, Saint Beuve, Schiller, Sherrington, Thayer, Volkman, Werlhof; (artists) John Bell, Bright, Seymour, Hayden, Hodgkin, Leidy, Leonarde, Lister, Pasteur; (musicians) A. de Bary, Borodin, Sir Robert Christian, J. W. Farlow, A. G. Gerster, Hemmeter, Hermann, Jacobson, Kahlbaum, Duke Karl Theodor, J. Loeb, Naunyn, Max Schultze.

[3] *J. Am. Med. Assn.*, 1916, LXVI, 319–324.

Soon the desire will come to piece together the fragments thus acquired, or to the methodical mind a preliminary survey of the whole field will perhaps be a first requisite. Then such readable and reasonably brief outlines as Osler's "Evolution of Modern Medicine," Seelig's "Lectures," Dana's "Peaks," Park's "Epitome" or Libbey, Withington, Baas or Dunglison—all one-volume works—can be read with profit, even though it may not be possible to read any one from cover to cover. Garrison's history is in a class by itself, comprehensive, accurate, concise, including all medical history in one volume, and yet, *mirabile dictu*, easy and pleasant reading. It is a model of what such things should be and is by all odds the first book on the subject for a student to buy. The larger more detailed histories, Neuburger, Pagel, Haeser, Hirsch, Daremberg, etc., all in foreign languages, can be considered "for reference only" by us amateurs (in both senses) of the subject. On the medical history of our own country, Packard's book is authoritative and I understand that there is soon to be another edition; and in the history of medical history, the seventeenth century works of Le Clerc and Freind (the two first on the subject) are quaint and interesting.

Finally let me repeat that while I am suggesting nothing that will help pass your examinations or perhaps even attract patients when you first hang up your shingle, I can assure you that the development of a love for and an acquaintance with the history of your profession will bring you something much more profitable in the long run—a capacity to advance further in that profession and a greater personal satisfaction in your work and play, both while so doing and after the more active days are past.

A Short Reading List

Shorter Works:

Camac, C. N. B. Epoch-making Contributions to Medicine, Surgery and the Allied Sciences. Saunders, 1909.

Seelig, M. G. Medicine—An Historical Outline. Williams & Wilkins, 1924.

Osler, Wm., Sir. Evolution of Modern Medicine. Yale University Press, 1921.

Withington. Medical History from the Earliest Times (Short and only to 19th century). London, "The Scientific Press," 1894.

Libbey, W. The History of Medicine. Houghton Mifflin Co., 1922.

Park, R. Epitome of the History of Medicine. F. A. Davis, 1901.

Dunglison, R. History of Medicine. Philadelphia, 1872.

Dana, C. L. The Peaks of Medical History. Hoeber, 1926.

Cumston, C. G. The History of Medicine from the time of the Pharaohs to the end of the 18th century. 1926.

Complete Histories:

Garrison, F. H. History of Medicine, 3rd Ed. Saunders, 1924.

Packard, F. A. History of Medicine in the U. S. Lippincott, 1901.

Neuburger. History of Medicine (2 Vols. and incomplete). Oxford Publications, 1910–1925.

Daremberg, C. Histoire des Sciences Médicales. Paris, 1870.

Meunier. Histoire de la Médecine. Paris, 1924.

Baas. Leitfaden der Geschichte der Medizin. Stuttgart, 1880. (Translated by Handerson, '89.)

Meyer-Steineg, und Sudhoff. Geschichte der Medizin, 2nd Ed. Fischer, Jena, 1922.

Haeser. Geschichte der Medizin, 3 Vol. 3rd Ed. Jena, 1875.

Pagel. Geschichte der Medizin. Berlin, 1898 (revised, Sudhoff—1915).

Freind, J. The History of Physick. London, 1725.

Isis. The Journal of the History of Science Society. G. Sarton, Editor. Harvard.

Power & Thompson. Chronologica Medica. London, Bale & Daniellson, 1923.

Biography:

Kelly. American Medical Biographies. Norman Remington, Baltimore, 1920.

Bayle. Biographie Médicale. Paris, 1855 (2 Vols.)

Jourdain. Encyclopédie des Sciences Médicales. Supplément (7 Vols.).

Dezeimeris. Dictionnaire Historique de la Médecine Ancienne et Moderne. Paris, 1828 (4 Vols.).

Hutchinson, B. Biographia Medica. London, 1799 (2 Vols.).

(See also Appendices in Garrison's History.)

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EXIT HUEBNER'S TENTAMEN!

All lepidopterists having a thorough knowledge of the nomenclature of their science will welcome Opinion No. 97, recently handed down by the International Commission on Zoological Nomenclature. (See Science, LXV, p. 301.) This opinion should terminate for all time the contention concerning Hübner's "Tentamen," long ago thought to have been settled, but which recently has been revived in certain quarters.

Hübner's "Tentamen" is a small quarto sheet issued by Jacob Hübner, of Augsburg. The title is: "Tentamen determinationis digestionis atque denominationis singularum stirpium Lepidopterorum, peritis ad inspiciendum et dijudicandum communicatum, a Jacobo Hübner." Literally translated, the title is "An attempt to fix, arrange, and name the individual races of Lepidoptera, submitted by Jacob Hübner to experts for examination and the expression of an opinion." At the end the author adds a warning, "Ne expectet quis, ordinem hunc nullam amplius correctionem esse desideraturum, verumtamen magis satisfaciet necessitati, quam prævius quivis. Familiis indicandis supersedere malui." This warning says: "Let no one expect that this arrangement makes further correction undesirable, but it will more nearly satisfy necessity than anything which has gone before. I have preferred to place [it, *i.e.*, *'the order of Stirpes'*] above the families, which *are to be indicated.*"

In order to understand what Hübner meant it is necessary to understand the system of classification which he employed. It was an advance upon that originally proposed by Linnæus. Linnæus in his "Systema Naturæ" established among the insects the order *Lepidoptera* to include the butterflies and moths. Linnæus set up only three genera: *Papilio, Sphinx,* and *Phalæna.* Into these three genera he put five hundred and thirty-five species: one hundred and ninety-two species under *Papilio*; thirty-eight species under *Sphinx,* and three hundred and five species of moths under *Phalæna.* Linnæus himself recognized the incongruities arising from thus throwing together a multitude of forms into but three categories, or *genera,* as he called them. He attempted to bring about a subdivision by resorting to quadrinomials, intercalating fanciful and grotesque subdivisions, which exact systematists with more time and material at their command later have discarded, or modified, adopting some of the names he employed as generic and reducing his quadrinomials to binomials. But this does not concern us at this point.

The system adopted by Hübner involved a number of subdivisions. It is as follows:

Order LEPIDOPTERA

a. *Phalanges* (*Germanice* Horden; *Anglice* hordes) = SUBORDERS, in modern parlance.

b. He divided the *Phalanges,* or Hordes, into *Tribus* (*Germanice* Rotten; *Anglice* tribes) = SUPERFAMILIES.

c. He subdivided the *Tribus* into *Stirpes* (*Germanice* Stämme; *Anglice* races, or clans) = FAMILIES, as now used.

d. He subdivided the *Stirpes* or races, into *Familia* (*Germanice* Familien; *Anglice* families) = SUBFAMILIES, as now used.

e. He subdivided the Families into *Coitus* (*Germanice* Vereine; *Anglice* unions) = GENERA in the Linnæan sense.

f. He subdivided the *Coitus* into *Genera* (*Germanice* Arten; *Anglice* kinds, or species) = SPECIES in the Linnæan sense, and as now employed.

The "Tentamen" was issued as a preliminary inquiry, bearing upon a work contemplated by the author to be issued in the future. This work is the "Verzeichniss bekannter Schmettlinge," published by Hübner in 1816. In its production he largely followed the arrangement of the "Stirpes" suggested by him in the "Tentamen," as he tells us in his introduction, adding: "I made known [the Tentamen] to the end that it might be examined and passed upon by experts before I adopted it."

On examining the "Verzeichniss" we find that he employs the "Stirpes" names, many of which he had suggested in the "Tentamen." He adds a great many "family-names," as promised in the warning at the foot of the "Tentamen." The arrangement of the butterflies in the "Tentamen" is as follows:

LEPIDOPTERA

Phalanx I. Papiliones

Tribus I; nymphales

I. Nerëides—Nerëis Polymnia.
II. Limnades—Limnas Chrysippus.
III. Lemoniades—Lemonias Maturna.
IV. Dryades—Dryas Paphia.
V. Hamadryades—Hamadryas Jo.
VI. Najades—Najas Populi.
VII. Potomides—Potamis Iris.
VIII. Oreades—Oreas Proserpina.

Tribus II; *gentiles*

I. Rustici—Rusticus Argus.
II. Principes—Princeps Machaon.
III. Mancipia—Mancipium Brassicæ.
IV. Consules—Consul Fabius.
V. Urbani—Urbanus Malvæ.

Turning from the "Tentamen" to the "Verzeichniss" we find under Stirps I, *Nerëides,* which he cites as equivalent to *Heliconii* Linn., that the name *Nerëis* nowhere occurs! We find the names *Hymenitis, Ithomia, Oleria, Eueides, Mechanitis,* etc. The specific name *polymnia* Linnæus given in the "Tentamen," in the "Verzeichniss" appears under the genus (*Coitus*) *Mechanitis,* and there it has remained for one hundred and ten years since Hübner published the "Verzeichniss," as every systematist knows.

Taking up Stirps II proposed in the "Tentamen," the *Limnades,* we find that the generic (*coitus*) name *Limnas* does not anywhere occur in the "Verzeichniss," but we find under the *Limnades* such well-known generic names as *Amauris, Hestia, Euplœa, Anosia,* etc. The species *Chrysippus* L. is found in the genus *Euplœa!*

Stirps III of the "Verzeichniss" is not mentioned in the "Tentamen," but includes such genera as *Eurybia, Echenais, Mesosemia, Charis, Euselasia,* etc. Stirps III represents what we now know as the *Erycinidæ,* or, as some would have it, the *Riodinidæ.*

Stirps IV of the "Verzeichniss," = Stirps III of the "Tentamen," contains the so-called *Lemoniades.* The genus *Lemonias* is not given under the *Lemoniades!* We, however, find the genus *Melitæa.* The butterfly which in the "Tentamen" appears as *Lemonias maturna* in the "Verzeichniss" is *Melitæa maturna* Linnæus, and under this name has been familiar to every German schoolboy from the days of Hübner to the present time.

Stirps V in the "Verzeichniss" is equivalent to Stirps IV of the "Tentamen" and bears the same name, *Dryades.* Under this heading we find the genera *Phyciodes, Brenthis, Argynnis, Colænis,* etc. Under the genus (*coitus*) *Argyronome* we find *A. paphia* Linn. as a species. Nowhere does the genus (*coitus*) *Dryas* appear!

Stirps VI of the "Verzeichniss" is equivalent to Stirps V of the "Tentamen," bearing the same name, *Hamadryades.* No genus *Hamadryas* appears anywhere in the "Verzeichniss," but among the genera enumerated under the *Hamadryades* are *Vanessa, Pyrameis, Precis, Junonia,* etc. The species indicated in the "Tentamen" as *Hamadryas Io* is found as No. 22 under the genus *Inachis.*

And so the student may go on throughout the entire list, discovering the fact that the apparently generic names prefixed to the species, which are cited in the "Tentamen," do not occur at all in the "Verzeichniss," of which, as Hübner tells us, the "Tentamen" was the foundation.

Now what is the explanation of this fact? In order to understand it we must endeavor to put ourselves in Hübner's place and follow the workings of his mind at the time he was engaged in his studies. At the moment he sketched the "Tentamen" for submission to his learned friends and correspondents the matter immediately before him was not the setting up of genera, but the creation of what he calls *Stirpes.* He was seeking for a natural subdivision of the lepidoptera into *Stirpes,* or what we now call *families.* He was giving no thought whatever to the minor subdivision into genera or *Coitus* (Vereine) as he called them. In the "Tentamen" he proposes a series of *Stirpes* or family-names. In order to visualize to his correspondents what he had in mind he took the specific names of a number of well-known species and prefixed to these specific names the name of the *Stirps* (not of the genus) into which he proposed to put the insect. Any man who simply confines his attention to the "Tentamen" and fails at the same time to take into consideration the "Verzeichniss" is certain to go astray, as has unfortunately been the case with some recent writers. It is as unfortunate

for a student of this matter to confine himself and his thought to Hübner's "Tentamen" as it would be for a man endeavoring to write a life of Christ to confine himself to the Gospel according to St. Matthew and to omit all reference to the other three gospels. The gospels supplement each other. The "Verzeichniss" explains the "Tentamen" and shows beyond the shadow of a doubt that he is in error who accepts the names in the "Tentamen," which look like generic names, as being such in reality. The "Verzeichniss" shows clearly that Hübner did not intend them to be so used. He simply cites certain species as representative of what he intended to include in his proposed *Stirpes*.

Passing from this critical examination of the subject, it should be said that the International Commission on Nomenclature has done right in deciding that the "Tentamen" was, as all students who have investigated the matter understand it to have been, merely a circular letter. Although it was printed on paper (typewriters, hectographs and other manifolding devices were unknown in Hübner's day) it was not *published* as "a zoological record."

In this connection I can not refrain from quoting a sentence contained in a letter received from my honored friend, Dr. F. A. Bather, of the British Museum, who anent the question of the "Tentamen" says: "I think it is perfectly awful to decide that a man can not ask the opinion of his friends as to the value of certain names without being thereby committed to them eternally." All that Hübner did in the "Tentamen" was to circularize his acquaintances, and he would turn in his grave if he imagined that his private correspondence, forgotten until S. H. Scudder published a facsimile of the letter in 1873, was being employed to upset the system he published in the "Verzeichniss," as well as to upset a system of nomenclature based in large part on his patient labors, but improved by those who have come after him, and which has been practically in use for a century.

Certain workers in the field of terminology, obsessed with the idea that by slavish obedience to the "law of priority" they can establish a final and satisfactory nomenclature, should be reminded that consistent usage, covering a century, or more, in the use of names, is also not to be disregarded. "A rose under any other name would smell as sweet." But roses are roses; they are not cabbages; and, when some man reminds me that certain roses long ago and even recently have been called "cabbage-roses" and tells me that I must therefore call all roses cabbages, because in combination cabbage "has priority" over rose, I naturally am ruffled.

As a student of the lepidoptera for sixty years and with the entire literature of the subject at my fingers' tips, I object emphatically to having the terminology of my favorite science upset by efforts which, however well meant, show that those who are making them possess "more zeal than knowledge."

Opinion 97 will be accepted by all thorough students of the terminology of the lepidoptera with gratification. The thanks of the lepidopterists of the world are due to the Commission for the Opinion which they have handed down. It will tend mightily to clear up a situation which has been most annoying to students of the lepidoptera, as well as the great public, including compilers of dictionaries and encyclopedias. Only recently I received a letter from a young correspondent who said to me: "What is the matter? Why are they always changing the names of the butterflies? I have arranged my collection using the generic names given in your Butterfly Book. Must I now call my Argynnids *Dryases;* my Vanessas *Hamadryases?*" I answered him by saying, "No! The generic names *Argynnis* and *Vanessa* have been used prevalently by reputable scientists for a hundred and twenty-five years. You have the authority of all the leading writers in the world for their use."

It is high time that trifling in matters of zoological nomenclature should come to an end. As the croupier at Monte Carlo says, when a too ardent player strives to lay down his belated stakes on the table: *"Le jeu est fait. Rien ne va plus!"*

W. J. HOLLAND

GEORGE BISHOP SUDWORTH

THE recent death at his home in Chevy Chase, Md., on May 10, of George Bishop Sudworth, for more than forty years the dendrologist of the United States Forest Service, removes from the scientific world a man who at the time of his death was unquestionably the most eminent living authority on forest trees in the United States, and one of the greatest in the world.

Born at Kingston, Wisconsin, in 1864, he attended the country schools of those days and studied botany, ornithology, dendrology and kindred sciences. He was graduated eventually, however, from the University of Michigan, as a physician and surgeon. After a year of teaching botany at the Michigan Agricultural College, he surrendered to his natural desire for the open, and was appointed botanist and dendrologist to the old division of forestry in the U. S. Department of Agriculture on August 31, 1888, and from that date forestry became his life work. Mr. Sudworth was the oldest member of the Forest Service in point of years of service. Just a few weeks

prior to his death his revision of his well-known "Check List of Forest Trees of the United States, their Names and Ranges," first published in 1898, was issued; a work of which he was extremely proud and which was unquestionably the crowning event of his busy life, a monument to his energy, ability and knowledge of forestry.

It is interesting to note that in the twenty-seven years between the date of the original publication of this valuable work in 1898 and this latest revision, more than 570 additional trees have been listed, the total number of different sorts of trees printed in the revision being 1,177.

In this new check list Mr. Sudworth has performed a valuable service in bringing order out of the bewildering mass of local tree names. This was a work in which he was greatly interested not only because of its value to the student and the professional forester but also as a protection to the public against deception in the purchase of lumber.

In addition to the "Check List," Mr. Sudworth published "Forest Trees of the Pacific Slope," "Cypress and Juniper Trees of the Rocky Mountain Region," "Spruce and Balsam Fir Trees of the Rocky Mountain Region," and "Pine Trees of the Rocky Mountain Region." Besides the works mentioned he wrote and published many other bulletins and papers on dendrology and other lines of practical as well as scientific forestry.

Mr. Sudworth was greatly interested in boy scout organizations. The section in the Boy Scout Manual devoted to tree identification was one of his contributions to that movement.

His knowledge of trees was based on broad field experiences and explorations. He knew the woods as a practical woodsman as well as scientist. He explored almost every nook and corner of the United States in search of new trees and information regarding doubtful species. During his years in the Forest Service he became thoroughly acquainted with all of the National Forests, and his explorations and discoveries have been invaluable aids in the administration and protection of the National Forests. While he always claimed a special fondness for the oak family, he undoubtedly discovered and named more new trees of every kind than any other modern American forester. Those who have been with Mr. Sudworth in the woods were always greatly impressed with his powers of close observation and keenness in discovering apparently new varieties of forest trees or deviations from established types. His wonderful memory and his ability to locate without referring to books or notes the exact place and time where he had seen trees of approximately the same kind were always matters of profound surprise.

During his explorations in the field, especially in the western United States, he was the victim of numerous unfortunate accidents which brought from him the remark one day to the effect that it seemed to him that he was destined never to die in his bed. One of his most thrilling experiences was in 1910 while exploring the high mountain regions of the Cochetopa National Forest in Colorado. He and a forest ranger were caught at timberline in an unexpected snowstorm about twenty miles from the ranger station. His horse stumbled in the deep snow and fell from the trail, Mr. Sudworth being caught beneath the animal. Cleared of the horse, he found he had broken two ribs and his collar bone. The horse was uninjured, and Mr. Sudworth, assisted by the ranger, mounted and rode about ten miles to an abandoned Mexican hut, arriving there just about nightfall suffering untold agonies from his injuries. Owing to the storm, it was absolutely impossible for them to travel further and they remained in the cabin that night, their only food being potatoes, of which they found a sack in the cellar of the cabin. During their enforced stay, Mr. Sudworth with his early knowledge of surgery did what he could to make himself comfortable, cutting up a saddle blanket into strips with which he bound his body to support the broken ribs and protect his collar bone from further injury. At noon the next day the storm broke and they managed to reach a small hamlet where a young medical student was living, who, assisted by Mr. Sudworth, did everything that could be done with their limited resources to relieve his suffering. In this condition he rode in a wagon for about twenty-five miles to the nearest railroad and took the train for Ann Arbor, Michigan, where he placed himself under the care of an experienced surgeon who found the temporary remedies used very satisfactory. He had at least two other such accidents, equally serious but from which he emerged without permanent injury.

Mr. Sudworth was one of the most lovable, kindly, companionable men imaginable. Every man in the Forest Service was his friend, and many a forest ranger and his wife hidden away in some government station in the western mountains will mourn sincerely the news of his untimely death. To spend a month with him in the forests, as did the writer, was at once an education and a privilege; a never-to-be-forgotten experience.

He was a member of the Washington Academy of Sciences, the Biological Society of Washington, the Botanical Society of Washington, the Society of American Foresters, the American Forestry Association, and an honorary member of the Finska Forstsamfundet, a Danish forestry association.

In addition to his work in the Forest Service, Mr. Sudworth was for fifteen years an active member of the Federal Horticultural Board, being one of its original members, taking a very lively interest in its work especially in relation to the importation and interstate shipment of nursery stock which might spread insect pests and diseases of trees.

He was married to Frances Gertrude Kingsbury, of Michigan, in 1897 and left no children.

His body was sent for burial to his early home at Crossopalis, Michigan.

WILL C. BARNES

U. S. FOREST SERVICE

SCIENTIFIC EVENTS

MEMORIAL OF THE RESEARCH CLUB OF THE UNIVERSITY OF MICHIGAN

IN the deaths of Wm. J. Hussey, Alfred H. Lloyd and Francis W. Kelsey the Research Club mourns the loss of three most distinguished members, who were not only able research workers but were even better known for their promotion of research and of the facilities for research.

Professor William Joseph Hussey achieved international distinction through his contributions to Astronomy, especially in the field of binary stars, and brought his department in the University of Michigan to the point where it was regarded as one of the foremost in his subject in the United States. Products of his efforts in the direction of provision for research are found in the additions to the Observatory of the University of Michigan, the now active La Plata Observatory and the Lamont Southern Observatory in process of erection in South Africa. Products of his research are found in the volumes of the Lick, the La Plata, and the Detroit Observatories, and in considerably more than one hundred papers in various astronomical journals.

Dean Alfred Henry Lloyd, a philosopher who pondered the problems of ultimate being and made great progress in ordering man's conception of them, had an influence on research which can not be measured by the five books and numerous articles published by him. As graduate dean he gave every encouragement to the promotion and publication of investigations in every field and made many innovations in organization and in obtaining funds that were of great assistance in themselves and set precedents that promise much for the future.

Professor Francis Willey Kelsey was elected to the Research Club within recent years, though he had long been known as an able scholar and a tireless worker both in organizing research and in gathering material for it. His most conspicuous achievement during his earlier period was the establishment of the University of Michigan Studies, Humanistic Series, of which the 21st volume will appear this year. His own published books were either textbooks or translations, two of which, however, the Mau-Kelsey *Pompeii,* and Hugo Crotius *Law of War and Peace,* contained much original work. Most of his research work, however, is found in shorter papers, which appeared in the various classical journals. In 1920 he organized the Near East Expedition of the University, which has already made Michigan the leading American university in its collections of papyri, manuscripts and archeological material. The value of the research which his efforts have occasioned and will continue to make possible can not be over-estimated.

THE NATIONAL ARBORETUM

FOLLOWING one of the provisions of the act of the last congress establishing a National Arboretum at Washington, Secretary of Agriculture Jardine has announced the membership of the advisory council, which is to plan and develop the arboretum. The members are Frederic A. Delano, Washington, D. C., member of the board of regents of the Smithsonian Institution, *Chairman;* Dr. L. H. Bailey, Ithaca, New York; Henry S. Graves, dean of the School of Forestry, Yale University; Harlan P. Kelsey, Salem, Mass.; John C. Merriam, president of the Carnegie Institution of Washington; Mrs. Frank B. Noyes, Washington, D. C., chairman of the District of Columbia committee of the Garden Club of America; Frederick Law Olmsted, Brookline, Mass., former president of the American Society of Landscape Architects; Mrs. Harold I. Pratt, Glen Cove, L. I., secretary of the Garden Club of America; Robert Pyle, West Grove, Pa., director of the Society of American Florists and Ornamental Horticulturists.

The act authorizing the secretary of agriculture to establish the National Arboretum is as follows:

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the Secretary of Agriculture is authorized and directed to establish and maintain a national arboretum for purpose of research and education concerning tree and plant life. For the purpose of this Act, (1) the President is authorized to transfer to the jurisdiction of the Secretary of Agriculture by Executive order any land which now belongs to the United States within or adjacent to the District of Columbia located along the Anacostia River north of Benning Bridge, and (2) the Secretary of Agriculture is authorized in his discretion to acquire, within the limits of the appropriation authorized by this Act by private purchase, condemnation proceedings, or gift, land so located or other land within or adjacent to the District of Columbia: *Provided,* That the purchase price of any part of said land shall not ex-

ceed the full value assessment of such property last made before purchase thereof plus 25 per centum of such assessed value.

SEC. 2. There is hereby authorized to be appropriated a sum not to exceed $300,000, to be expended under the direction of the Secretary of Agriculture for the acquisition of land as specified in Section 1. No payment shall be made by the United States for any such land until the title thereto is satisfactory to the Attorney-General and is vested in the United States.

SEC. 3. In order to stimulate research and discovery the national arboretum established by the Secretary of Agriculture in accordance with the provisions of this Act shall be under competent scientific direction. The arboretum shall be administered by the Secretary of Agriculture separately from the agricultural, horticultural and forestry stations of the Department of Agriculture, but it shall be so correlated with them as to bring about the most effective utilization of its facilities and discoveries.

SEC. 4. The Secretary of Agriculture is authorized to create an advisory council in relation to the plan and development of the national arboretum to be established under this Act, to include representatives of national organizations interested in the work of the arboretum.

MOSQUITO CONTROL

COLONEL S. P. JAMES, M.D., of England, and Professor N. H. Swellengrebel, of Holland, interchange observers of the Malaria Commission of the Health Secretariat of the League of Nations, are visiting the United States to inspect mosquito eradication and control methods. According to a statement made by Dr. Hugh S. Cumming, Surgeon-General of the U. S. Public Health Service, they will visit, primarily, the southern areas of the United States, where modern methods of mosquito control are being used with a view to eradicating the purveyors of malaria. Methods which they consider practical will be introduced into European countries where malaria is present. They also will endeavor to advise health authorities in this country on the procedure employed in Europe in mosquito control. They are making the inspection trip in the United States as the guests of the International Health Board, with which the Public Health Service is cooperating.

Accompanying Colonel James and Dr. Swellengrebel is Colonel F. F. Russell, U. S. Army, retired, who Dr. Cumming stated is the man chiefly responsible for anti-typhoid vaccinations in the army. Colonel Russell is now affiliated with the International Health Board.

Dr. Cumming also pointed out that the United States is recognized as the country foremost in developing malaria control measures, and has evolved many methods of eradication, both of malaria and of mosquitoes that convey the disease.

One of the latest methods employed by the Public Health Service in cooperation with other government agencies is the use of airplanes in spraying a potent mixture of Paris green over marshy areas that were breeding grounds for mosquitoes. This method has proved eminently successful, and also has proved to be an economical method both from the standpoints of time consumed and money expended.

AWARD OF THE LANGLEY MEDAL

THE fourth award of the Langley Medal of the Smithsonian Institution was made on June 11, to Colonel Charles A. Lindbergh. On behalf of the Board of Regents, Dr. Abbot made the presentation to Colonel Lindbergh in person at the National Press Club reception in the Washington Auditorium, on June 11. Dr. Abbot said:

The Smithsonian Institution knows how to appreciate the pioneering work of brave men. You will recall, as a single example, our honored one-armed hero, Major Powell, who dared for science the first passage of the uncharted raging waters of the Grand Canyon of the Colorado, strapped in his boat. We are not less stirred to admiration by your own daring in the first non-stop flight from New York to Paris over the boisterous Atlantic through icy clouds that threatened death.

Nor is the institution failing to appreciate, sir, the precious results in the encouragement of aviation, in the strengthening of ties of international friendship, and in the progress of science, which have already begun to flow from your achievement.

The Smithsonian has in its gift a medal which commemorates the name of Samuel Pierpont Langley, the third secretary of this institution. He had the audacity to believe in the practicability of the art of flying when all men were ridiculing it; and he adventured his own high reputation as a man of science to lay the groundwork of exact experiments, and to make pioneering flights of large models, which demonstrated the soundness of his faith. The Langley Medal has hitherto been presented to Wilbur and Orville Wright, to Glenn H. Curtiss and to Gustave Eiffel. Thus it is from all points of view the medal of pioneers. It is highly fitting that it should now be awarded to you, sir, the pioneer of audacious, solitary flight to distant shores.

Therefore, acting on the unanimous recommendation of an eminent committee of award, the regents of the Smithsonian Institution have voted to you the Langley Medal, and have recorded their action in this paper signed by the chancellor, Mr. Chief Justice Taft, which I now present to you.

The actual medal, in gold, is being struck in Paris. I hope that when it is received you may do the institution the honor to appear on some suitable occasion and receive it in person.

APPOINTMENTS AT THE ROCKEFELLER INSTITUTE FOR MEDICAL RESEARCH

THE board of scientific directors of The Rockefeller Institute for Medical Research announces the following appointments and promotions:

NEW APPOINTMENTS:

Member	Dr. Carl Ten Broeck
Associate	Dr. Arthemy A. Horvath
Assistants	Dr. Mortimer L. Anson
	Miss Alice H. Armstrong
	Dr. Alan M. Butler
	Mr. Albert E. Casey
	Mr. Edwin B. Damon
	Dr. Claude E. Forkner
	Mr. Henry P. Gilding
	Dr. Alvin R. Harnes
	Mr. Oscar M. Helmer
	Dr. Alexander Hoffman
	Dr. Perrin H. Long
	Dr. Alfred E. Mirsky
	Dr. Gordon H. Scott
	Mr. Robert E. Steiger
	Mr. Ernest Sturm
Fellow	Mr. Rene J. Dubos

PROMOTIONS:

Associate Member to Member	Dr. Thomas M. Rivers
Associate to Associate Member	Dr. Carl A. L. Binger
	Dr. Leslie T. Webster
Assistant to Associate	Dr. Lillian E. Baker
	Dr. Lawrence W. Bass
	Dr. Walther F. Goebel
	Dr. Lawrence S. Kubie
	Dr. Fred W. Stewart
	Mr. James van der Scheer
Fellow to Assistant	Mr. Irving A. Cowperthwaite

Dr. Ten Broeck is at present professor of bacteriology and Dr. Horvath assistant in medicine at the Peking Union Medical College, Peking, China.

Dr. Pierre L. du Noüy will spend the next year at the Pasteur Institute, Paris.

SCIENTIFIC NOTES AND NEWS

AT the commencement of Yale University, the doctorate of science was conferred on Dr. John Jacob Abel, professor of pharmacology, of the Johns Hopkins University; on James Colquhoun Irvine, principal and vice-chairman of the University of St. Andrews, and on Dr. Alfred North Whitehead, professor of philosophy in Harvard University; the doctorate of laws on Dr. Charles Value Chapin, health officer of Providence, Rhode Island, and the master's degree on George Hoyt Whipple, pathologist, dean and professor of pathology of the School of Medicine and Dentistry, University of Rochester; on William Buckhout Greeley, chief forester of the United States; on Commander Richard E. Byrd, first aviator to fly over the North Pole, and on Charles L. Lawrence, designer of aeronautical engines.

THE University of Wisconsin has conferred the honorary degree of doctor of science on Dr. George David Birkhoff, professor of mathematics in Harvard University, on Dr. Frank Baldwin Jewett, president of the Bell Telephone Laboratories, Inc., and on Dean De Witt Lewis, surgeon-in-chief to the Johns Hopkins Hospital.

THE doctorate of laws of the University of Rochester was conferred on Dr. Michael Idvorsky Pupin, who gave the commencement address, and the doctorate of science on Dr. Harrison E. Howe, editor of *Industrial and Engineering Chemistry*, and on Elon H. Eaton, professor of biology at Hobart and William Smith Colleges.

HARVARD UNIVERSITY has conferred the degree of doctor of science on Dr. George Edmund de Schweinitz, the oculist, of Philadelphia.

DR. ALICE HAMILTON, assistant professor of industrial medicine at Harvard University, received the degree of doctor of science at the commencement exercises of Smith College.

DARTMOUTH COLLEGE has conferred the degree of doctor of laws on Dr. Max Mason, president of the University of Chicago, and the degree of doctor of science on Professor Dayton C. Miller, of the Case School of Applied Science, and on Professor Frank P. Brackett, director of the observatory of Pomona College.

THE University of Georgia has conferred upon Professor Andrew H. Patterson, head of the department of physics at the University of North Carolina, the degree of doctor of science.

AT its graduation exercises, the Massachusetts Agricultural College conferred the honorary degree of doctor of laws on Dr. Edward M. Lewis, president of the University of New Hampshire.

DR. WILLIAM E. WICKENDEN received the degree of doctor of engineering at the commencement exercises of the Worcester Institute of Technology.

GUSTAVE WHYTE THOMPSON, chief chemist of the National Lead Company, delivered the graduation address at the Armour Institute commencement exercises in Chicago and received the honorary degree of doctor of science.

AT the ninety-third annual commencement exercises of Franklin College, Franklin, Ind., Dr. Harry Edgar

Mock, assistant professor of surgery in the Northwestern University Medical School, was awarded the honorary degree of doctor of science.

THE Oklahoma State College, Stillwater, Okla., at its thirty-second annual commencement, May 31, conferred the honorary degree of doctor of science upon Professor W. A. Tarr, professor of geology at the University of Missouri, and the honorary degree of doctor of agriculture upon Professor W. L. Burlison, professor of agronomy at the University of Illinois. These degrees were the first conferred by the college.

AT a meeting of the Royal Institution on May 9, Sir J. J. Thomson was elected honorary professor of natural philosophy, and Sir Ernest Rutherford professor of natural philosophy. The chairman announced that the president, the Duke of Northumberland, had nominated, among others, Sir Dugald Clerk and Sir Charles Parsons as vice-presidents for the ensuing year.

THE first award of the Charles B. Dudley medal, established by the American Society for Testing Materials, has been made to Dr. D. J. McAdam, Jr., metallurgist at the United States Naval Engineering Experimental Station at Annapolis, Md., for a paper on "Stress Strain—Cycle Relationship and Corrosion—Fatigue of Metals."

A PORTRAIT of Dr. William S. Baer, chief medical officer at the Children's Hospital School, Baltimore, and associate professor of clinical orthopedic surgery at the Johns Hopkins Medical School, has been presented to the hospital school.

PROFESSOR ALAN W. C. MENZIES, of Princeton University, will represent the American section of the Society of Chemical Industry at its annual meeting in Edinburgh in July, and will tender the invitation of the section to the society to hold its next annual meeting in New York.

DR. ERNEST W. BROWN, professor of mathematics at Yale University, has been appointed to represent the University of Cambridge at the centenary of the University of Toronto on October 6.

DR. H. L. WALSTER, dean of the School of Agriculture of the North Dakota Agricultural College, was elected president of the North Dakota Academy of Science for the coming year at the recent conference held at Grand Forks. Dr. Walster succeeds Professor Karl H. Fussler, head of the department of physics of the University of North Dakota. The Academy will hold its next convention at Fargo.

PROFESSOR K. D. GLINKA, director of the Soviet Experimental Station at Leningrad, has been elected president of the International Congress of Soil Science, composed of delegates from thirty countries. Leningrad will probably be chosen as the place for the next meeting.

SIR DANIEL HALL retired on June 4 from the post of director-general of the intelligence department of the British Ministry of Agriculture, which he has held since 1920. He will continue to act as chief scientific adviser and chairman of the Research Council of the Ministry.

SIR RICHARD GLAZEBROOK has been appointed, by Order of Council dated May 26, to be a member of the Advisory Council to the Committee of the British Privy Council for Scientific and Industrial Research.

MISS ELIZABETH F. HOPKINS, assistant botanist in the Seed Testing Laboratory of the New York State Agricultural Experiment Station at Geneva, has resigned in order to accept an offer from the Massachusetts Agricultural College to organize a seed testing laboratory at that institution.

DR. THOMAS A. JAGGAR, of the Hawaiian Volcanic Observatory, has arrived in Alaska, where a scientific study of volcanic eruptions and earthquakes is being carried out by the U. S. Weather Bureau. He will superintend the installation of seismographs at Dutch Harbor and at Kodiak.

DR. HERBERT GROVE DORSEY, senior electrical engineer of the U. S. Coast and Geodetic Survey, has been transferred to the Pacific Coast for a few months to supervise the installation and adjustment of the fathometer on the survey ships *Pioneer, Guide* and *Surveyor,* working off the coasts of Oregon, Washington and Alaska.

O. M. MILLER, director of the school of survey of the National Geographic Society, headed a party which sailed for South America on June 23 to explore the source of the Maranon River, one of the chief tributaries of the Amazon.

NEIL M. JUDD, curator of American archeology in the United States National Museum, has left Washington to complete his explorations at Pueblo Bonito, New Mexico, under the auspices of the National Geographic Society. This season's expedition is the seventh sent by the society for the purpose of recovering and recording the story of this prehistoric Indian village.

DR. WILLIAM B. WHERRY, professor of bacteriology at the University of Cincinnati and member of the Board of Health, will lead an expedition into Mexico this summer to test the efficacy of the new treatment for typhoid fever.

DR. WILMOT C. FOSTER, assistant professor of anatomy of the University of Oregon Medical School, has

been granted a year's leave of absence to work in surgical anatomy at the Mayo Clinic, Rochester, Minn.

MRS. AGNES CHASE, associate botanist in the grass herbarium of the Bureau of Plant Industry, has returned from Europe where she spent several weeks studying type specimens of American grasses. She visited the herbaria at Vienna, Freiburg, Munich, Paris and Geneva. Of special importance was the De Candolle Herbarium acquired by the Delessert Herbarium, Geneva, and recently made accessible to visiting botanists by the director, Dr. John Briquet. The material of the De Candolle Herbarium, which is the basis of the Prodromus and the series of monographs, is segregated in the De Candolle Room; the remainder is incorporated in the general collection of the Delessert Herbarium.

Nature states that Mr. H. C. Sampson, who was recently appointed economic botanist at the Royal Botanic Gardens, Kew, left on June 11 for British Guiana at the invitation of the governor and under the auspices of the Colonial Office and Empire Marketing Board, to study and report on various agricultural matters in the colony. He will also visit Trinidad and the Imperial College of Tropical Agriculture, and Barbados.

FRANCIS G. BENEDICT, director of the nutrition laboratory of the Carnegie Institution of Washington, in Boston, recently gave at the University of New Hampshire a lecture on "Physiological Research Institutions of Europe."

DR. SERGIUS MORGULIS, professor of biochemistry in the University of Nebraska College of Medicine, delivered an address on "Enzymes in the Service of the Cereal Chemist" at the annual convention of the Association of American Cereal Chemists on June 3.

THE medical library composed of 4,424 volumes, of the late Dr. George S. Huntington, professor of anatomy in the college of physicians and surgeons of Columbia University, said to be one of the rarest of its kind, will be purchased by the alumni, who have undertaken to raise a $35,000 fund for the purpose in memory of Dr. Huntington. The collection will be known as the George S. Huntington Collection and will be kept intact at the medical center.

DR. CHARLES FREDERIC MABERY, for thirty-five years head of the laboratory of the Standard Oil Company and since 1883 professor of chemistry at the Case School of Applied Science, Cleveland, died in Portland, Me., on June 26, at the age of seventy-seven years.

CHARLES FREDERIC RAND, former chairman of the executive board of the Engineering Foundation, died on June 21, at the age of seventy years.

JOHN M. GOODELL, former editor of the *Engineering Record* and an associate editor of *Engineering News*, died on June 22, aged sixty years.

THE fifteenth International Geological Congress will meet in South Africa in 1929.

THE Swiss Society of Natural Sciences will hold its 108th annual meeting from September 1 to 4 at Basel. The president, Dr. Fritz Sarasin, will give the opening address on September 1, which will be followed by a lecture by Professor A. Brachet (Brussels) on the causes and factors of morphogenesis; other lectures will be given by Professor L. Courvoisier (Berlin) on recent work and views in astronomy, by Professor L. Duparc (Geneva) on the Urals from the point of view of geophysics, geology and mining, and by Professor H. E. Sigerist (Leipzig) on Paracelsus in relation to modern thought. The general work of the meeting will be divided among fourteen sections.

THE Cyrus F. Brackett series of lectures at Princeton University next year will include a lecture by L. H. Kinnard, president of the Bell Telephone Company of Pennsylvania, on October 15 on "Development of Long Distance Telephony"; by the president of the National Broadcasting Company of New York, M. H. Aylesworth, on "Radio—The University of the Air"; by Dr. Frank B. Jewett, president of the Bell laboratories in New York, on "Cooperative Research," and by James T. Wallis, assistant vice-president of the Pennsylvania Railroad, who is to speak about "The Development in Motive Power on the Pennsylvania System."

DR. E. H. ANDERSON, director of the New York Public Library, writes: "Add one more to your record of copies of Durant's 'The Algae and Coral Lines of the Bay and Harbor of New York.' The New York Public Library has Durant's own copy of this book."

THE firm of Johnson & Johnson, manufacturers of surgical supplies, New Brunswick, N. J., has established at the Mellon Institute of the University of Pittsburgh a fellowship that will study the exact requirements of surgeons and other medical specialists in the way of sundries, with the joint aim of developing new supplies that are needed and of standardizing the products now in use. An investigation will also be made of the processes of renovating used supplies, and several other Industrial Fellowships of the Institute will cooperate in devising satisfactory procedures. Dr. Frederic H. Slayton, M.D. (Rush) will be in direct charge of this research. All its investi-

gations will be conducted primarily for the benefit of the public. It is the plan to report the results in appropriate periodicals as the various phases of the studies are concluded.

THE Royal Aeronautical Society has recently received the following letter from Mr. Harry F. Guggenheim, president of the Daniel Guggenheim Fund for the Promotion of Aeronautics, Inc.: "It affords me great pleasure to advise you that the Daniel Guggenheim Fund for the Promotion of Aeronautics, Inc., has approved a grant of $5,000 to the Royal Aeronautical Society to enable it more easily to continue its splendid contributions to the aeronautical science of the world. It is the hope of the fund that this grant may stimulate the growth and strength of the Society to such a point that within a short while financial assistance from without will be unnecessary."

TEMPORARY reservation of a tract of public land in Nevada containing Lovelock Cave has been authorized by an executive order issued by the U. S. Department of the Interior. The area on which the cave is located contains approximately 40 acres and is in Churchill County. Its withdrawal is for the purpose of affording opportunity of scientific study of interesting prehistoric material found in the cave. According to the secretary of the Smithsonian Institution articles taken from Lovelock Cave are in a remarkable state of preservation and are particularly valuable on this account. With its temporary retention in public ownership as a result of the executive order, the site will be the subject of further archeological research.

THE National Forest Reservation Commission met recently, under the chairmanship of Secretary Davis, of the war department, and approved the purchase of 96,000 acres additional to the White Mountains National Forest in New England, the Allegheny in Northwestern Pennsylvania and the Pisgah in North Carolina. The commission also gave a hearing to a delegation from New England which urged the purchase of 23,000 acres within the boundaries of the White Mountain National Forest in New Hampshire, containing one of the few virgin timber stands in Northeastern United States. No decision was reached.

AN Imperial Agricultural Research Conference, at which delegates from all parts of the Empire will be present, will be held in London beginning on October 4. The Ministry of Agriculture and Fisheries decided some time ago to call such a conference in 1927, and the proposal was endorsed by the last Imperial Conference, which appointed a special sub-committee to inquire into research. The ministry is responsible for arranging the conference, and the Empire Marketing Board is providing the necessary funds. An organizing committee has been appointed under Lord Bledisloe's chairmanship and has already held its first meeting.

MILK ISLAND, lying off the coast of Gloucester, Mass., has been accepted by the state as a wild life sanctuary, according to an announcement of the state division of fisheries and game of the Department of Conservation. The island is the gift of Mrs. Roger Babson to the Federation of the Bird Clubs of New England, upon condition that it shall be known as the Knight Wild Life Reservation, in memory of Mrs. Babson's mother and father. The federation, in turn, has deeded the property to the state in trust for this purpose, and the governor and council have accepted it by formal vote. It will be administered by the Fisheries and Game Division, of which William C. Adams is director.

UNIVERSITY AND EDUCATIONAL NOTES

AT the commencement exercises of Harvard University it was announced that during the year 1926–27 the university had received gifts of $6,003,372, in addition to subscriptions to the ten-million-dollar campaign and to the alumni endowment fund and the income received under the will of Gordon McKay. Most of these gifts have during the year been chronicled in SCIENCE. Those of special interest to scientific men include: anonymous, for research and instruction in abnormal and dynamic psychology, $25,113; from the estate of Richard Dana Bell, for biological chemistry in the medical school, $100,000; from the General Education Board for the department of ophthalmology, $188,400; from the International Education Board endowment, for a southern astronomical observatory, $180,000; from the estate of Arthur S. Luke, for medical and surgical science, $237,081; from the Rockefeller Foundation, for the school of public health, $137,250; from the Laura Spelman Rockefeller Memorial, for industrial psychology and for a survey of crime, $37,000; for the Charles Sprague Sargent Memorial Fund, $142,720; from Dr. Frederick C. Shattuck, to establish the Richard P. Strong Fund in Tropical Medicine, $100,000; from Harold S. Vanderbilt, for a medical school dormitory and salary for an instructor of physical training in the medical school, $470,100.

GIFTS to Wellesley College amounting to $814,000 were announced at the recent commencement exercises, bringing the Centennial Fund to $7,220,000. The gifts include $100,000 by George W. Farwell, of Boston, to establish the Ruby Frances Howe Farwell chair of botany, and $40,000 from the class of 1882, for the Susan Hallowell chair of botany. A gift of

$30,000 by Mrs. Robert Gould Shaw will be divided: $10,000 to the Hallowell chair of botany, $20,000 to the Hallowell Arboretum.

Bowdoin College has received a gift of $175,000 from Augustus F. Moulton, of Portland, for the construction of a Bowdoin Union, to be the social center of the college.

The legislature of the state of Kansas before adjournment appropriated $300,000 for the erection of new buildings for the school of medicine of the University of Kansas at Kansas City. $100,000 is for a new nurses' home and $200,000 for an additional ward unit.

The University of Pittsburgh announces the appointment of Dr. Robert T. Hance as professor and acting head of the department of zoology. Dr. Hance has been associated for the past several years with the Rockefeller Institute for Medical Research.

At the Carnegie Institute of Technology the following appointments have been made: John H. Neelley, associate professor of mathematics; Howard V. Russell, assistant professor of physics and Walter H. J. Taylor, assistant professor of chemical engineering.

The following promotions are announced in the department of psychology at the University of Pennsylvania: to professorships of psychology: Drs. Samuel W. Fernberger and Karl G. Miller, and to assistant professorships of psychology: Drs. Robert A. Brotemarkle, Henry E. Starr and H. Sherman Oberly.

Dr. R. L. Shriner, associate in biochemistry at the New York State Agricultural Experiment Station at Geneva, has accepted a position in the chemistry department at the University of Illinois.

Dr. Tomlinson Fort, head of the department of mathematics at Hunter College, New York City, has resigned in order to accept a similar position at Lehigh University.

Dr. Alexander G. Ruthven has been elected chairman of the department of zoology at the University of Michigan, and Dr. Robert R. McKibbin, assistant professor of soils at the University of Maryland, has been appointed lecturer in the chemistry department of Macdonald College, McGill University, Ste. Anne de Bellevue, Quebec, Canada.

DISCUSSION AND CORRESPONDENCE

CONCERNING "SPECIES-GRINDING"

In Science for December 10, 1926, Dr. James G. Needham gives an interesting and well-deserved encomium of the natural history work of Dr. Curtis Gates Lloyd. But in praising his friend, Dr. Needham quotes from one of the least laudable of his personal prejudices.

In a general criticism of workers in taxonomy as engaged in "species-grinding," "practiced for the purpose of seeing one's name in print," "a sort of cheap notoriety which places a premium on slip-shod and hasty description," he takes a needless slap at a group as a whole signally unselfish and conscientious. For systematic zoology and botany give most of our clues to the origin of species, and therefore to "organic evolution," and on accuracy in taxonomy rests all our actual knowledge of geographical distribution. Slip-shod amateur work in any field is a nuisance in science, and there is no field it may not sometimes invade. The greater the public interest in any branch of science, the more likely it is to attract the charlatan and those unquiet spirits who find the methods of science too slow and laborious.

In the interest of accuracy, taxonomists are obliged to resort to what Dr. Lloyd calls contemptuously "The time-wasting devices of priority hunters because he deemed them a hindrance to science." In like manner care for tools or instruments of precision in any science is likewise "time-wasting." It takes effort as keen for an anatomist to keep his knives sharp as for a geneticist to keep track of his observations. The eminent "intuitionists" do not do this, and in the long run their inspired guesses count for nothing.

More than eighty years ago Agassiz justified the work he put on his "Nomenclator-Zoologicus," as an effort to save systematic zoology from the utter confusion into which it was then falling. It was plain to him, as to all conscientious workers that the language of systematic science could not be altered at will without being made incomprehensible and useless, and that the law of priority was the sole basis on which order in the naming of any group could be established. If for any reason a writer rejects an earlier or established name for one he likes better, it opens the door to anybody's play of choice. Take any name you like or make a new one, and all continuity and certainty is lost. We know more or less well a million kinds of animals and almost as many plants, and we are not yet near the end of the list. To declaim against law and order in nomenclature is a sin against accuracy. That there are so many kinds of life in one small world is not the fault of naturalists. Facts are facts, and our duty is in Agassiz's oft-quoted words, to "strive to interpret what really exists."

All easy problems in biology are already solved, and any of the others may bring up new points of view. Practically also, one line of genuine work in any field is just as difficult as in any other and just as important. To sneer at any other lines of

effort as of low order or as "hodman's labor," is a mark of ignorance, not of critical judgment.

A word as to the custom of quoting the author of a name adopted for a species. Its chief motive is in convenience and accuracy, almost or quite never for the purpose of "giving some one a sort of cheap notoriety." It is, of course, not always necessary, and when needless it is seldom done.

DAVID STARR JORDAN

STANFORD UNIVERSITY,
MAY 5, 1927

BIOLOGY VERSUS MYTHOLOGY IN A CRIMINAL COURT

A LARCENY trial unique in the annals of criminology, resulting in conviction by a jury of five on March 15, 1927, grew out of a series of thefts of preserved frogs from the Southern Biological Supply Co., Inc., of New Orleans, La., by two former collectors of the company. The interesting feature of the trial was virtually a clash between modern mythology on the one hand and the sciences of ecology and taxonomy on the other. A single charge was filed covering only one theft, that of 462 preserved frogs consisting of five species, four of local and one of northern distribution. The defendants, pleading not guilty, set forth the plea, through their attorney, that it is a well-known fact that evaporation draws frogs and fish up into the clouds and the rain showers them again onto the land. It was therefore easily explained how the race of Rana pipiens indigenous to Indiana and Wisconsin was collected in St. Bernard Parish in southeast Louisiana by the collectors, who sold them to a competitor and to a local university.

The employees of the company described and identified the five species in the barrel from which the frogs were stolen, these including a large percentage of Rana pipiens which had been imported from the two northern states during the shortage resulting from the unprecedented droughts of 1924 and 1925. Every detail in the chain of circumstantial evidence was presented by the state, even the purchasers acting as state's witnesses. Percy Viosca, Jr., and Henry B. Chase, Jr., of the Biological Company, were qualified as experts in taxonomy and ecology of the Anura, and it was necessary for living and preserved frogs to take the stand as exhibits in order to prove the story of the defendants untrue. A surprise of the trial was the presentation by the defendants of living specimens of Rana pipiens which they claimed they caught in St. Bernard Parish the night before the trial in a typical Rana sphenocephala habitat, several hundred miles from the nearest approach of the range of pipiens. The defense attorney then attempted to prove that the defendants had secured their knowledge of frogs through experience, whereas the state's experts had secured theirs from book study, but it was proven otherwise. The verdict was in a sense a victory for science in that the results of scientific study seemed to make a better impression upon a jury of New Orleans citizens than the fables and argumentation of the defense attorney.

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DATUM AND DATA

I HAVE more than once publicly protested against that abomination "data is." We say "phenomenon is" and "phenomena are," and I do not recall in Latin any singular verb used in English with a plural noun, excepting poor "data is."

I presume one reason is that "datum" is a rare word. The city "Datum" is the fixed level from which all heights and depths are measured, and "data" are the basic facts upon which we found a definite conclusion. I am glad to join with Dr. Morse in his protest against a singular verb and a plural noun.

The Oxford, the Century and the Funk and Wagnalls dictionaries all give "data, pl. of datum." Webster's does not list "data" but under "datum" says "pl. data."

W. W. KEEN

IN view of certain remarks which have appeared in SCIENCE recently concerning the use of the word "data," I feel minded to essay the rôle of devil's advocate for the apparently incorrect use. We speak and hence write English by ear and not by rules of grammar. Rules to the contrary notwithstanding, if "this data" sounds better than "these data" it will be used. There must be a more fundamental reason why "data" should be regarded as a singular rather than a plural. I believe there are two reasons. First, in this country we regard collective nouns either singular or plural in form as syntactical singulars. Such does not seem to be the case in England. For example: in this country "the committee is," while in England "the committee are," yet the phrase "committee of one" shows that we regard a committee composed of a single person as the exception, not the rule. Second, in ordinary use, "data" is not the mere plural of "datum." The two words possess quite different connotations. "Datum" appears to be almost exclusively used for a primary level in surveying while "data" connotes information or facts. Hence "data" as the plural of "datum" is a syntactical plural while "data" in the sense of facts is a collective which is preferably treated as a singular.

CHARLES H. BLAKE

AIRGRAPHY OR AEROGRAPHY?

In the *Bulletin* of the American Meteorological Society (April 1927, p. 69) the suggestion is made that the word *aërography* (study of the air) henceforth should be written *airgraphy*. On this side of the Atlantic we have done away with the word aëroplane (which certain of the Boeotians pronounced a-ery-o-plane) and use the simpler, equally expressive term airplane.

A new reason for adopting the change is found in the increasing use of the word *areographic* by astronomers in connection with planetary atmospheres.

Thus, Professor W. H. Wright, of the Lick Observatory, discussing the ice cap on Mars speaks of "the exact areographic position of every cloud or atmospheric peculiarity."

If we are to continue the use of aerographic and areographic, we offer the types a fine opportunity to do their worst in transposition; to say nothing of professorial orthography!

And, while we are about it, can we not abandon *meteo*graph and *meteo*therm for airgraph and airtherm?

Alexander McAdie

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"ASTRONOMIC"

Who introduced the word "astronomic" into astronomic literature and why did he do it? "Special Publication No. 110 of the U. S. Coast and Geodetic Survey" is entitled "Astronomic Determinations." Plans have been made for "An Ideal Astronomic Hall" in the American Museum of Natural History, though there is some comfort in the fact that it is "to be devoted to astronomical and kindred subjects . . ." We even find the terms "astronomic latitude" and "astronomic time" in a recently published astronomic text-book. I see no object in lining up the comfortable old word "astronomical" with geocentric, pneumatic, egophonic and gastronomic. If we don't look out, some one will take all the joy out of our new word "astrophysical."

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SCIENTIFIC APPARATUS AND LABORATORY METHODS

DIRECTIONS FOR DETERMINING THE COLLOIDAL MATERIAL OF SOILS BY THE HYDROMETER METHOD

In the issue of October 8, 1926, of this journal there appeared a brief article proposing the hydrometer method as a very rapid means of determining the colloidal content of soils. Since the publication of this paper a great number of letters have been received asking for more detailed information as to technique, kind of hydrometer used, etc. In view of this large number of inquiries, it has seemed advisable to publish in advance of the main report the directions for executing a colloidal determination and other essential information concerning the method.

The use of the hydrometer method for determining the colloidal content of soils in only fifteen minutes is based upon the fact that there is a remarkably close relationship between the colloidal content of soils as determined by the heat of wetting method and the percentage of material, based on the sample taken, that stays in suspension in a liter of water, at the end of fifteen minutes. There is a fundamental basis for this relationship, for it holds true for all types of soils and various amounts of samples taken. The only soils that do not give a very close relationship are the peats and mucks and this is because it is almost impossible to disperse those organic materials.

The success of the hydrometer method for determining colloids is based upon a complete dispersion of the soil. This can be accomplished remarkably well and most rapidly by means of a stirring motor, such as is used in mixing malted milk. In using this machine, however, care must be taken to use a special cup made purposely with baffles in it in order to prevent the circular motion to which the soil-water mixture is subjected without these baffles. The machine will disperse a soil in ten minutes which an ordinary shaker will require more than twenty-four hours to accomplish.

The soils can be dispersed also by hand from about ten to fifteen minutes, but such dispersion can not be uniform and not always complete and consequently is not recommended. If it is absolutely necessary to disperse by hand, then the following procedure may be followed. Place fifty grams of soil, 100 grams in case of sandy soils, based upon the dried basis in a mortar, add enough distilled water to make a paste and pestle vigorously. Add more water to make a thin suspension, stir, let it stand half a minute and pour supernatant liquid in the cylinder. Pestle the paste again vigorously and again add water to make suspension and at the end of half a minute pour supernatant liquid in the cylinder. Continue this operation until all the clays are dispersed or the liquid is almost clear. To the mixture add 5 cc of 1N KOH. For making hydrometer readings follow directions given below.

If the stirring motor is used, the procedure is as

follows: Place fifty grams of dry soil in the cup, in the case of sandy soils 100 grams, add 5 cc of 1N KOH, fill cup with distilled water one and one half inches from the top and stir it by the motor for nine minutes. The mixture is then washed into a cylinder having a total capacity of about 1,130 cc. The hydrometer is placed in the cylinder and the latter is filled clear to the top with the hydrometer still in it in order to facilitate the reading of the hydrometer from the top of the liquid column. The hydrometer is then taken out, and the mixture is stirred vigorously for about a minute, using one palm as a stopper. The cylinder is placed on the table and the time is quickly noted, preferably by a stop watch. The hydrometer is put in the mixture and at the end of fifteen minutes the reading is noted. Just about half a minute before the fifteen-minute period is up, however, the hydrometer is pushed down gently in order to avoid any lagging. The reading, which is grams per liter, is divided by the weight of sample taken, and the result is percentage of colloids in that soil. The temperature of the mixture is also noted and the necessary correction made. All readings must be reduced to 67° F., which is the temperature at which the hydrometer was calibrated. A change of 1° F. makes a difference of about 0.35 per cent. of colloids. For temperatures above 67° F. the corresponding amount is added to the percentage indicated by the hydrometer, and for temperatures below 67 the amount is subtracted.

The hydrometer gives an average measurement of the densities for the entire column of liquid, down to where the solid soil column is formed. To make allowance for the water required to saturate the soil, 1,050 cc of water is added to every fifty grams of soil. A special cylinder is made which, when filled entirely with soil and hydrometer in it, will contain 1,050 of water, and thus the necessity of having to measure the water every time is eliminated. An ordinary 1,000 cc cylinder may also be used by making a mark of the proper volume.

The method may appear empirical, but it really gives quite absolute results. The results it yields are also absolutely comparable for different soils. For instance, the rate of settling of soil particles is governed largely by their size. This being the case, then the amount of material staying in suspension at any given time has about the same average size of particles for the different soils. The hydrometer, when floating, is governed entirely by physical laws without any outside factors entering or any personal element entering into it. Its readings, therefore, are quite accurate.

Since the hydrometer method gives absolutely comparable results for the different soils, and since the results show a very close relationship with the results of the heat of wetting method, it probably means then that the heat of wetting method for determining the colloidal content of soils has been a correct method. Evidently, both methods tend to measure the same thing.

From all our present knowledge, it appears that the hydrometer method can be employed to determine the colloidal content of soils, quite accurately. The method is also very rapid, the colloidal content of more than three soils can be determined in less than one hour, using only one hydrometer.

The hydrometer can also be used to measure the rate of settling of soil particles from which a distributed curve should be worked out.

Referring once more to the dispersing machine there are two things that must be strictly guarded against, the first is that the cup must have the baffles or wires in it, and the second is that the paddle or button on the stirring rod tends to wear out in sandy soils. When it becomes flat it must be replaced, because in the flat condition it loses its stirring efficiency. With these two precautions to watch out for, it can be said that this machine is most wonderful for dispersing soils for any purpose.

The detailed report of this work will appear in *Soil Science* shortly.

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SPECIAL ARTICLES

THE LIFE HISTORY OF TAPEWORMS OF THE GENUS MESOCESTOIDES

THE generic name *Dithyridium* Rudolphi, 1819, has been used by zoologists to designate agamic cestodes having an elongate body and containing an invaginated scolex which bears four suckers but lacks both hooks and a rostellum. These larval parasites have been reported from a variety of mammalian and non-mammalian hosts, in most cases in relation with the body cavity and its membranes and viscera. In one instance they have been reported from the voluntary muscles and the heart. Morphologically these larvæ appear to occupy a position intermediate between those of pseudophyllid and cyclophyllid cestodes, their general body shape resembling that of the former, whereas the scolex is suggestive of a cyclophyllid tapeworm.

Although there has been some speculation as to the relationship of these larvæ to known strobilate tapeworms, no conclusive experimental work designed to elucidate the ultimate development of Dithyridium

larvae has been published up to the present time.[1] Neumann (1896), Ransom (1907) and some other investigators have been struck by the morphological similarity of the scolex of Dithyridium and that of the genus Mesocestoides parasitic in the intestine of various mammals and birds. Neumann appears to have been the first investigator who suggested a connection between Dithyridium and Mesocestoides. Unfortunately, that investigator postulated what appears to be an unsound biological hypothesis to account for this relationship and his experimental work designed to test his hypothesis is decidedly inconclusive, a fact which he himself recognized. Neumann was inclined to regard Dithyridium as an erratic, immature cestode (Mesocestoides) which succeeded in reaching the body cavity apparently as a result of perforating the stomach or intestinal wall or in some other manner and which was destined to perish in this location without completing its further development. He also postulated a direct life cycle for Mesocestoides and expressed the opinion that the ingestion of hexacanth embryos of this tapeworm by a suitable host probably results in the development of a mature strobilate tapeworm in the intestine.

Recent investigations by the present writer have shown Neumann's interpretation of Dithyridium to be erroneous. Not only have these parasites a typical larval organization, consisting of a simple unsegmented ribbon-shaped body and an invaginated head provided with four suckers, but in common with other infective larval tapeworms they are capable of reaching maturity in the small intestine of a suitable definitive host. When ingested by a susceptible host Dithyridium develops into a strobilate tapeworm belonging to the genus Mesocestoides. Dithyridium thus bears the same morphological and biological relationships to Mesocestoides as Sparganum bears to Diphyllobothrium and as Cysticercus bears to Tænia.

Briefly stated, the writer succeeded in rearing Mesocestoides in dogs and cats as a result of feeding them Dithyridium obtained from the peritoneal cavity and lungs of a mongoose. As early as forty-six days after ingestion of Dithyridium, gravid segments of Mesocestoides were found in the feces of dogs which prior to experimental infection were ascertained to be free from cestodes. Fifty-one days after experimental ingestion of five live specimens of Dithyridium, five mature specimens of Mesocestoides were recovered from a cat at necropsy. Before ingesting the larvæ the cat was free from tapeworms so far as fecal examinations showed anything. As Mesocestoides has never been found in native dogs and cats in the Eastern United States, it seems safe to assume that that no such worms were present.

On the basis of these experiments, which it is hoped will be supplemented by the results of additional feeding tests which are now in progress, it may be safely concluded that the definitive host becomes infected with Mesocestoides as a result of devouring a carcass or a portion of a carcass of an animal harboring Dithyridium and that the latter is not a tapeworm which has accidentally strayed from its course but is a true larva in a normal location in an intermediate host.

It still remains to be determined whether the hexacanth embryos contained in the egg capsule of each gravid proglottid of Mesocestoides are capable of infecting the intermediate host directly, as is known to be the case in cyclophyllid cestodes whose life histories have been determined, or whether the embryos undergo their earlier larval development in an invertebrate, intermediate host before they can metamorphose into infective larvæ in a vertebrate, intermediate host. The answer to this question must await the results of experiments which are now in progress.

While this investigation was in progress an abstract[2] of a paper in Russian by Skrjabin came to the writer's attention. Among other references to Professor Skrjabin's recent work in helminthology was the statement that he had found that mice are the intermediate hosts of *Mesocestoides lineatus*.

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[1] This manuscript was submitted for publication on April 8 and while it was in the hands of the editor Professor Henry published a paper (Rec. de méd. vét., v. ciii, no. 8, April 30, 1927) reporting experimental results essentially similar to those covered in this paper.

ACCLIMATIZATION OF BUFO TADPOLES TO ETHYL AND METHYL ALCOHOLS[1]

THAT animals may become immune to toxic substances that ordinarily will destroy them is too well known to call for comment. Since the work of such pioneers as Sewall and Erlich a mass of information has been collected on this subject. Yet in one phase, at least, the experimental data are not consistent. Studies of the resistance that organisms exhibit towards alcohol after they have been immersed in a weak solution of it for some time have failed to produce uniform results. Daniel ('09) has made rather an extensive study of the effects of ethyl alcohol upon Stentor and Spirostomum, subjecting them for various periods of time to a weak solution of the alcohol, and then killing them along with controls in a stronger solution. In general he holds that the ani-

[2] Berl. tierarztl. Wchnschr., v. 42 (52), Dec. 24, 1926.

[1] Contribution from the Department of Zoology, University of Michigan.

TABLE I

Showing acclimatization to alcohols. The animals designated "treated" were either kept in a weak solution of methyl or of ethyl alcohol for a number of days, or were exposed to an 8 per cent solution of ethyl alcohol for 5 minutes each day for several days. The results shown in the table were obtained by exposing for 20 minutes equal numbers of treated and control tadpoles to 11 1/9 per cent. methyl or 8 per cent. ethyl, depending on the alcohol to which the treated animals had been exposed, after which all were transferred to water and the number that recovered noted.

Alcohol used for acclimatization	Concentration of alcohol used to test for acclimatization	Number of tadpoles used in the experiment		Number of tadpoles that recovered		Percentage of tadpoles that recovered	
		Control	Treated	Control	Treated	Control	Treated
Methyl	11 1/9 per cent. methyl	107	107	11	43	10.3	40.2
Ethyl	8 per cent. ethyl	207	207	44	102	21.3	49.3

mals did become acclimated. The treated protozoa generally lived considerably longer than the controls. Yet of the two strains of *Stentor* employed, one, while given exactly the same treatment as the other, showed little or no indication of acclimatization and led the author to remark (p. 611), "the fact that in these experiments some strains show little or no capacity for becoming acclimatized to alcohol although tried for long periods of time and with refined methods makes is questionable whether acclimatization takes place so readily and to so high a degree as is commonly supposed." Bills,[2] using Paramoecium and adopting a method similar to that of Daniel,[3] maintains that he not only obtained no indication of acclimatization, but that the treated animals were even less resistant to alcohol than those that were untreated.

An attempt to find out whether Bufo tadpoles will become acclimated to ethyl and methyl alcohols led to the experiments presented below. The tadpoles were put in solutions of one per cent. and three fourths per cent. ethyl alcohol, and one per cent., one half per cent. and one fourth per cent. methyl alcohol for periods varying from three days to about three weeks. In addition a number were treated for five minutes each day for several days with an eight per cent. solution of ethyl alcohol, which brought about complete narcotization, and were then returned to water and allowed to recover. Finally all were tested for acclimatization by placing them along with controls into 11 1/9 per cent. methyl or 8 per cent. ethyl alcohol for 20 minutes, after which they were transferred to water and the number that recovered ascertained. The results, greatly abbreviated, are given in the accompanying table.

Examination of the table will show that 107 animals were subjected to weak methyl alcohol and later placed for 20 minutes in a 11 1/9 per cent. solution of the same alcohol along with an equal number of controls, and that 43 of the treated animals recovered when they were transferred to water, while only 11 of the controls recovered. The table also shows that out of 207 tadpoles treated with ethyl alcohol, 102 recovered after having been subjected to an 8 per cent. solution of the alcohol for 20 minutes, and that only 44 out of a like number of controls recovered. These results seem to point unmistakably to an acclimatization.

Owing to the small number of animals used one can scarcely draw any conclusions as to the relative effects of the various solutions, and for this reason a detailed account of the experiments has not been given. The exact time required for acclimatization and the effect of one alcohol upon the ability of the tadpole to withstand another are also problems deserving of solution, but which the data at hand are too meager to solve. A more comprehensive set of experiments is contemplated, designed to throw light on these questions.

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[2] Bills, C. E., "Some Effects of the Lower Alcohols on Paramoecium." *Biol. Bull.*, vol. 47, pp. 253–264. 1924.

[3] Daniel, J. F., "Adaptation and Immunity of the Lower Organisms to Ethyl Alcohol." *Jour. Exp. Zool.*, vol. 6, pp. 571–611. 1909.

THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

THE SECOND NASHVILLE MEETING OF THE ASSOCIATION AND ASSOCIATED SOCIETIES

PREPARATIONS for the second Nashville meeting of the American Association for the Advancement of Science and associated societies, which will occur from December 26 to 31, are very well begun. Adequate lodging accommodations will be available, partly in hotels and partly in the Ward-Belmont and Peabody dormitories. The general headquarters will be the Andrew Jackson Hotel, in which will be the registration and news offices and the science exhibition. Headquarters for the societies that are to meet with the association will be announced later. Scientific sessions will be held mainly in the buildings of Van-